BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AFMS 38AB
26 October 1995

Manpower Standard

★*AIR TRAFFIC CONTROL AND LANDING SYSTEMS (ATCALS) RADAR MAINTENANCE*

★This Air Force Manpower Standard (AFMS) quantifies the manpower required to accomplish the tasks described in the process oriented description for varying levels of workload. ATCALS Radar Maintenance maintains the radar systems to support the safe takeoff, landing, and navigation of all active duty, Air National Guard, Reserve, Department of Defense and civilian aircraft that are stationed at or transit the base or airspace controlled by the base. These systems include airfield surveillance and precision systems in support of the flying mission. This includes National Air Space (NAS) and Federal Aviation Administration (FAA) remote equipment. They also maintain various support systems such as Control Tower displays, video mappers, secondary and weather radar systems, and associated test equipment. This AFMS applies to all locations authorized this function, during peacetime operations, except the following: Combat communications, Air National Guard and Air Force Reserve units, Keesler AFB MS, Nellis AFB NV, Tonapah Range NV, units having liaison duties only, and locations undergoing AFI 38-203, *Commercial Activities Program*, cost comparison studies. Both a positive and negative mission variance must be developed for all work within the organization that has undergone a cost comparison study. This AFMS was developed in accordance with policies and procedures contained in AFMAN 38-208, *Air Force Management Engineering Program (MEP).* Send comments and suggested improvements on AF Form 847**, Recommendation for Change of Publication**, through channels, to AFMEA/AEDA, 550 E Street East, Randolph AFB, Texas 78150-4451.

★*SUMMARY OF CHANGES*

This AFMS supersedes AFMS 38AB, 14 July 1994, to include all changes. It implements format changes to comply with SAF requirements. It also includes minor administrative changes in the overall layout of the AFMS. The approval date in paragraph 2.1 is changed to 1 March 1993. The Equipment Value for the AN/TPX-42 is corrected to read .312. Changes are identified with a ★.

1. Core Composition. The following factors and assumptions were considered to determine the core manpower required for ATCALS Radar Maintenance:

1.1. To support flying activities, radar equipment must be provided for aircraft to take off, land, and navigate within the airspace controlled by the base.

1.2. The level of service is based on workload routinely performed during the work center's hours of operation and on-call maintenance for unscheduled outages during other than normal duty hours.

1.3. Restoral priorities will be established and followed when personnel respond to multiple outages.

1.4. If the downtime occurs outside the normal flying hours, the work center's duty hours may be tailored to accommodate those times; i.e. 0400 to 0800 downtime with 0800 to 1300 the remaining on-duty time. Thereafter, maintenance will be on-call.

Supersedes AFMS 38AB, 14 July 1994
OPR: AFMEA/AEDA (Mr. Glen Craft)
Certified by: AFMEA/AED (Lt Col Terry Holtz)
Pages: 10/Distribution: F

1.5. **Core Equipment Composition:**

EQUIPMENT	TYPE	QUANTITY
VIDEO MAPPER	AN/GPA-131	1
BRITE II	AN/GPA-133	1
TRAINER	AN/GPN-T4	1
ASR	AN/GPN-12	1
PAR	AN/GPN-22	1
BEACON	AN/TPX-42	1

1.6. **Core Manpower Required.** 6

1.7. **Core Range.** 4 - 9

1.8. **Programming Factor:** None

2. Standard Data:

★2.1. **Approval Date.** 1 March 1993

2.2. **Man-hour Data Source.** Workshop Measurement

2.3. **Man-hour Equation.** Yc = 111.73 + 147.27(X)

2.4. **Workload Factor (WLF):**
2.4.1. **Title.** Summation of Equipment Equivalent Values.
2.4.2. **Definition.** The summation of equipment equivalent values for each radar end-item assigned to the unit. The equipment equivalent values were based on the actual maintenance man-hours required to maintain individual radar end-items.
2.4.3. **Source.** USAF Air Traffic Control (ATC) Facility Listing and Equipment Inventory List (EIL) maintained in the work center.

2.5. **Points of Contact:**
2.5.1. **Functional Representatives.**
2.5.1.1. CMSgt Peters, HQ USAF/LGMM, DSN 227-5642.
2.5.1.2. MSgt Carroll, HQ AFC4A/SYAF, DSN 576-4093.
2.5.2. **AFMEA Representative.** Mr. Glen Craft, AFMEA/AEDA, DSN 487-2479.

3. Application Instructions:

3.1. Determine the number of each type of equipment end-items assigned to the unit using the USAF ATC Facility Listing and EIL. Coordinate with the local Functional OPR to ensure that all equipment assigned is listed and that the listing is current.

3.2. Enter the quantity of each type of equipment end-item assigned to the unit on the Standard Application Worksheet in Attachment 5. Sum the results to find the computed value of X.

3.3. Consider the following when determining the equipment equivalent for the WSR-88D Next Generation Weather Radar (NEXRAD):
3.3.1. Maintenance support to NEXRAD falls into two basic categories:
3.3.1.1 Work centers that maintain a complete NEXRAD system.
3.3.1.2. Work centers that only maintain NEXRAD PUPs (Principle User Processors).
3.3.2. The WSR-88D equipment equivalent in Attachment 5 is based on a complete NEXRAD System (RPG, RDA, UCP, and one PUP). The PUP equipment equivalent is for those locations that only maintain PUPs. (Exception: Locations that maintain complete NEXRAD systems and more than one PUP would use the PUP equipment equivalent for each PUP in excess of one.)

3.4. Compute the man-hour equation using the WLF values found at Attachment 5, Application Worksheet.

3.5. Apply the appropriate Man-hour Availability Factor (MAF) and overload factor to find the fractional manpower requirement. Use current rounding rules to determine the whole manpower requirement.

3.6. Refer to the Standard Manpower Table at Attachment 2 to determine the skill and grade distribution of the manpower requirement.

4. Statement of Conditions:

4.1. **Climatic Conditions.** Extreme hot or cold temperatures can intensify maintenance requirements. Snow and ice cause certain tasks to be done more frequently, and rain and humidity impact the frequency of corrosion control performed on equipment.

4.2. **Physical Conditions.** The work center itself is generally not located with the equipment it services. Travel time is necessary to accomplish direct categories of work. The age of the equipment shelters, as well as the equipment itself, directly impacts the frequency of the maintenance categories of work.

4.3. **Directed Performance Standards.** Technical orders and equipment workcards contain directed performance standards for tasks performed by this work

center. These performance standards were considered and the applicable tasks measured accordingly.

4.4. **Direct and Indirect Man-hours.** Direct and indirect man-hours are included in each process. Indirect work involves those tasks that are not readily identifiable with the work center's specific product or service. The major categories of standard indirect work are Supervision, Administration, Meetings, Training, Supply, and Cleanup. See AFMS 00AA for the standard indirect description. Core man-hours for indirect work are computed in with equipment processes.

BENJAMIN N. CHAPMAN, Lt Col, USAF
Chief, Plans & Productivity Division

Attachments
1. Process Oriented Description
2. Standard Manpower Table
3. Variances
4. Process Analysis Summary
5. Application Worksheet

PROCESS ORIENTED DESCRIPTION

AIR TRAFFIC CONTROL AND LANDING SYSTEMS (ATCALS)
RADAR MAINTENANCE

A1.1. EQUIPMENT PREVENTIVE MAINTENANCE. Reviews schedules, performs preventive maintenance, assists in quality control inspections, and updates equipment status.

A1.2. EQUIPMENT REPAIR. Receives and verifies notification, notifies appropriate agencies, isolates problem, repairs equipment, and updates equipment status.

A1.3. SUPPLY. Performs maintenance on Due In From Maintenance (DIFM) assets, repairs DIFM assets, prepares Material Deficiency Reports (MDR)/Quality Deficiency Reports (QDR), and orders expendable parts.

A1.4. EQUIPMENT CERTIFICATION. Notifies appropriate agencies, prepares materials, operates equipment for certification, retrieves materials for evaluation and certification, returns materials after evaluation and certification, and updates equipment status for equipment evaluation and certification, and monitors auxiliary power source tests.

A1.5. SPECIAL MAINTENANCE. Performs equipment modifications, performs Time Compliance Technical Order (TCTO) tasks, assists visiting maintenance and Air Traffic Control and Landing Systems (ATCALS) teams.

A1.6. TRAVEL. Performs travel during normal duty hours and in response to nonduty hour equipment malfunctions.

STANDARD MANPOWER TABLE

WORK CENTER/FAC			**APPLICABILITY MAN-HOUR RANGE**								
Air Traffic Control and Landing Systems (ATCALS) Radar Maintenance/38AB			269.36 - 1784.51								
AIR FORCE SPECIALTY TITLE	**AFSC**	**GRADE**	**MANPOWER REQUIREMENT**								
ATC Radar Crftmn	2E071	MSG				1	1	1	1		
ATC Radar Crftmn	2E071	TSG	1	1	1	1	1	1	1		
ATC Radar Jrnymn	2E051	SSG	1	2	2	2	2	2	3		
ATC Radar Jrnymn	2E051	SRA	1	1	1	1	1	2	2		
ATC Radar Apr	2E031	A1C			1	1	2	2	2		
TOTAL			3	4	5	6	7	8	9		
AIR FORCE SPECIALTY TITLE	**AFSC**	**GRADE**	**MANPOWER REQUIREMENT**								
TOTAL											

AF Form 1113, JUN 91 (COMPUTER GENERATED). PREVIOUS EDITION IS OBSOLETE.

VARIANCES

AIR TRAFFIC CONTROL AND LANDING SYSTEMS (ATCALS)
RADAR MAINTENANCE

A3.1. Title. Positive Environmental Variance for Snow and Ice Removal.

A3.1.1. **Definition.** Workload associated with removing snow from equipment.

A3.1.2. **Impact.** +1.71 Monthly Man-hours.

A3.1.3. **Applicability.** All locations whose annual mean snowfall, as reported in the Station Climatic Summary, is 8 inches or greater.

A3.2. Title. Positive Mission Variance for Maintenance of Weather Radar.

A3.2.1. **Definition.** The ATC Radar Maintenance Work Center is responsible for maintaining the AN/FPS-77, or AN/FPQ-21, Weather Radar at some locations.

A3.2.2. **Impact.** Variable.

A3.2.3. **Man-hour Equation:**

Yc = -8.599 + 57.90(X1) + .4213(X2) + 4.25(X3).

A3.2.4. **Workload Factors (WLFs):**
A3.2.4.1. **Titles:**
A3.2.4.1.1. **X1.** An Equipment Equivalent.
A3.2.4.1.2. **X2.** A Thunderstorm Day.
A3.2.4.1.3. **X3.** Distance.
A3.2.4.2. **Definitions:**
A3.2.4.2.1. **X1.** The relationship of AN/FPS-77 workload to AN/FPQ-21 workload. The value for an AN/FPS-77 is 1.09 and the value for an FPQ-21 is .91.
A3.2.4.2.2. **X2.** The annual mean number of days when a thunderstorm occurs at the station where the radar is located. Obtain this number from the Station Climatic Summary maintained by the local weather unit.
A3.2.4.2.3. **X3.** The round trip distance from the work center to the radar transmitter. Obtain from work center personnel.

A3.2.5. **Applicability.** All locations where ATC Radar Maintenance work centers are tasked to maintain weather radar.

A3.3. Title. Positive Environmental Variance for Climatic Conditions.

A3.3.1. **Definition.** The ATCALS maintenance work center at Kadena AB is required to prepare facilities and equipment whenever thunderstorms and/or typhoon conditions exist and then return them to normal service after the condition no longer exists.

A3.3.2. **Impact.** +46 Monthly Man-hours.

A3.3.3. **Applicability.** Kadena AB JA

A3.4. Title. Positive Mission Variance for AN/TCM-6 Remote Microwave Link.

A3.4.1. **Definition.** To maintain the AN/TCM-6 Microwave System.

A3.4.2. **Impact.** +20 Monthly Man-hours.

A3.4.3. **Applicability.** All locations that are required to maintain a remote microwave link.

A3.5. Title. Positive Mission Variance for Off-base Travel.

A3.5.1. **Definition.** Off-base travel is required at some locations to maintain NEXRAD PUP(s) or remote microwave link(s). Use the equation below to compute allowed monthly man-hours for this travel.

A3.5.2. **Impact.** Variable:

Yc = D x F x 4 / v

Where "D" = One Way Distance in miles.

"F" = Frequency (Trips Per Month)

"V" = Vehicle Speed:

23 MPH for PACAF.

34 MPH for all others.

A3.5.3. **Applicability.** All locations required to perform off-base PUP or microwave support.

A3.6. Title. Positive Mission Variance for Additional ASR Indicators.

A3.6.1. **Definition.** This variance provides man-hours for maintaining more than eight (8) ASR indicators. (The basic equation provides man-hours for maintaining the first eight (8) ASR indicators.)

A3.6.2. **Impact.** Add six (6) monthly man-hours for each ASR indicator maintained in excess of eight (8).

A3.6.3. **Applicability.** All locations that are required to maintain more than nine (9) ASR indicators.

PROCESS ANALYSIS SUMMARY

AIR TRAFFIC CONTROL AND LANDING SYSTEMS (ATCALS)
RADAR MAINTENANCE

CATEGORY	**MAN-HOURS**	**FRACTIONAL MANPOWER**
1. EQUIPMENT PREVENTIVE MAINTENANCE	316.3224	1.970
2. EQUIPMENT REPAIR:	301.9972	1.880
3. SUPPLY:	126.7288	0.790
4. EQUIPMENT CERTIFICATION:	12.57907	0.080
5. SPECIAL MAINTENANCE	4.177722	0.030
6. TRAVEL:	72.37406	0.450
Total Fractional Manpower		5.200

APPLICATION WORKSHEET

Air Traffic Control and Landing Systems (ATCALS) Radar Maintenance

l. Man-hour Computation (Yc = 111.73 + 147.27(X)).

a. Equipment Equivalent Calculations: Enter the quantity of each type of equipment end item assigned to the unit and multiply by the appropriate equipment value. Sum the values to obtain the value for X in the man-hour equation.

EQUIPMENT END-ITEM	**QUANTITY**		**EQUIP VALUE**		
AN/FPN-62	_____	x	1.352	=	_____
AN/GPA-131	_____	x	0.432	=	_____
AN/GPA-133*	_____	x	0.409	=	_____
AN/GPN-T4	_____	x	0.750	=	_____
AN/GPN-T5	_____	x	0.750	=	_____
AN/GPN-12	_____	x	1.600	=	_____
AN/GPN-20	_____	x	1.700	=	_____
AN/GPN-22	_____	x	1.445	=	_____
★AN/TPX-42	_____	x	0.312	=	_____
WSR-88D**	_____	x	2.196	=	_____
PUP***	_____	x	0.235	=	_____

Summation of Equipment Equivalent values. _____

* D-Brite has same value as GPA-133.
** Complete NEXRAD system (RPG, RDA, UCP, and PUP).
*** NEXRAD PUP only.

b. Substitute the summation of equipment equivalent values for X in the man-hour equation and solve for Yc:

Yc = 111.73 +147.27 (____X_____) = _____ = Core Man-hours

2. **Variance Man-hours**.

a. Review the standard to determine which variances apply.

(1) Snow and Ice Removal (+1.71) = _____

(2) Weather Radar: Yc = -8.599 + 57.90(X1) + .4213(X2) + 4.255(X3) = _____

NOTE: Use the following workload factors for the AN/FPS-77 and AN/FPQ-21 weather radar:

X1 = Equipment Equivalent Value = _____ (Insert for X1 @ 2.a.(2) above)

FPS-77 = 1.09 x 57.90 = 63.11

FPQ-21 = .91 x 57.90 = 52.69

X2 = Thunderstorm Days.

Annual Thunderstorm Days _____ x 0.4213 = _____ (Insert for X2 @ 2.a.(2) above)

X3 = Distance to Radar Transmitter.

Round Trip Distance _____ x 4.255 = _____ (Insert for X3 @ 2.a.(2) above)

(3) Climatic Conditions at Kadena (+46.0) = _____

(4) AN/TCM-6 Microwave (+20.0) = _____

(5) Off-base Travel

Yc = D x F x 4 / v = _____

(6) Additional ASR Indicators = _____

b. Sum the total Variance Man-hours from 2a(1), (2), (3), (4), (5), and (6) above.

Total Variance Man-hours = _____

c. Sum the basic equation man-hours and variance man-hours to determine total man-hours.

Total Man-hours = _____

d. Divide the total man-hours from paragraph 2c above by the appropriate MAF and overload factor to determine the fractional manpower requirements based on workload.

Fractional Manpower = _____

3. Determine the whole manpower requirements.